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DETECTION OF NEAR ATMOSPHERIC DISTURBANCES AND WEATHER CONDITIONS

by I. I. Kamaldina

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ABSTRACT

The article considers the question of the relationship of data from detection of near storms and meteorological data.

Due to the spread of the cathodic detection network and the increase in the quality of its work in the Soviet Union, detection data can be considered valuable aids in the meteorologist's work. Many methodological questions arise in this respect, especially that of the relation of detection data to meteorological data, the theme of this article.

In the evaluation of errors of the detection network, observation data on near storms in June-August 1961 and June-July 1962 were used.

The synchronous determination of azimuths of storm sources was performed at four points in the Leningrad oblast (in 1961, Lomosov, Pushkin, Osinovets, Voyeykovo, and in 1962, Shapki, Gatchina, Osinovets, and Voyeykovo).

The minimum duration of readings was 10 minutes, although they were often prolonged due to meteorological conditions.

To insure reliable data, only such cases were selected as were determined by the participation of at least three recording stations. Storms within a periphery of 200 km from the point of observation were considered.

Storm detection data were compared with indicators from the meteorological stations conducting storm observations. The total number of stations was 42. From the TM-1 tables, only those storms and showers taking place during the measurement sessions were computed.

The meteorological situation was evaluated by cyclic weather charts compiled in the Leningrad weather bureau, determining the weather situation in the observed region. For comparison, however, indications by meteorological radar were used in addition to the 1961 material.

The most objective methodology possible was developed for evaluating the quality of the detection network work. For each individual session, percentile relations were calculated between the number of recorded storms and the total number of sources recorded by the meteorological network.

A given storm source was considered detected if the distance between its actual location and the location determined at detection did not exceed 40 km, considering that the average detection error for observed distances was of the order of 20 km, while the spread of the storm center's convective origin averaged 20-30 km.

Those storms not verified by observer stations, but located in the region which was acknowledged a storm area after evaluation of the meteorological situation, were included in the number of detected storms and, consequently, in the total number.

Figure 1 shows the case of detected storms, with the signs R and $\dot{\nabla}$ representing the relation of the storms and showers recorded at stations during detection times, and with points representing the sources of detected types. A total of 8 storms was detected, and is indicated in figure 1 by points, which composes 66 percent of the total number (12) of storm sources.

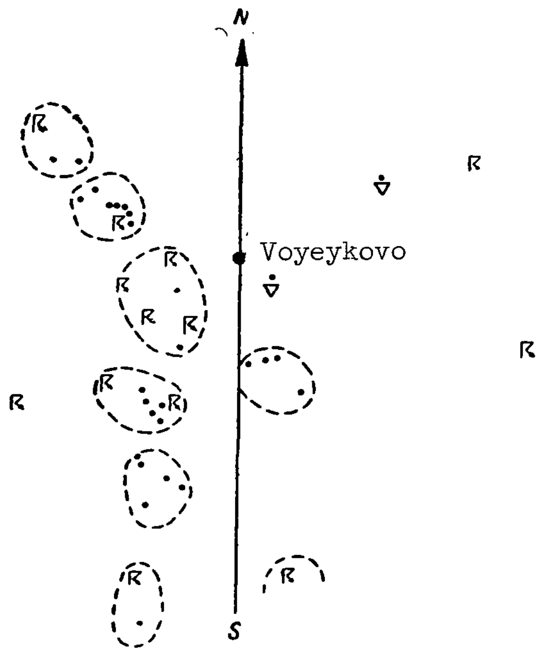

Figure 1. Storm source detection at 1100 hrs, Aug. 19, 1961.

In 1961-1962, 126 sessions were considered, as well as the relation of 640 atmospheric disturbance sources, and the results of evaluations are given in Table 1.

TABLE 1

	1961		1962	
	July	August	June	July
Total number of sources .	158	148	51	283
Number of detected sources and percentage of total number.	75.3	79.5	83.7	79.4

Of the total number of sources, an average of 79.5 percent were detected. From 126 sessions in 48 cases, 100 percent of the storms were detected, in 30 cases 75-100 percent, in 41 cases 50-75 percent, and in seven cases less than 50 percent of the sources.

As follows from the above information, 20.5 percent of the sources were not detected. This fact can be explained by several reasons, the most important of which are first the screening of distant storms by near storms, and secondly, the visual method of azimuthal calculation, in which the observer registers the intensive outbursts from the most active and lets pass the weaker of the less active storms.

Those cases in which detection data substantiate neither meteorological station indicators nor data of meteorologists are of particular interest. Thirteen sessions were sampled, composing 10 percent of the total, in which not one of the detected sources corresponded to the meteorological data. During these sessions, no station in a radius of 200 km noted showers or storms, nor was the meteorological situation considered that of a storm area.

Those sessions were the following:

	1961					
number.	June 16	July 3	July 4	July 14		July 17
time, hrs, min.	21:20	18:20	14:00	12:20	15:20	21:20

	1961						1962
number.	July 18		July 20			July 22	June 19
time, hrs, min.	12:20	03:20	12:20	15:20	18:20	12:20	11:00

The overwhelming majority of these sessions took place during July 1961. The most indicative of them are the cases of July 14 at 1220 hrs and July 20, 1961.

Study of similar cases represents a method for future investigators and is of great meteorological interest, first, because it can aid in distinguishing critical characteristics of the atmospheric state during the change from calm to stormy states and, secondly, it permits distinguishing atmospheric disturbance sources from calm origins.

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